GEDI
ECOSYSTEM LIDAR

Global Ecosystem Dynamics Investigation

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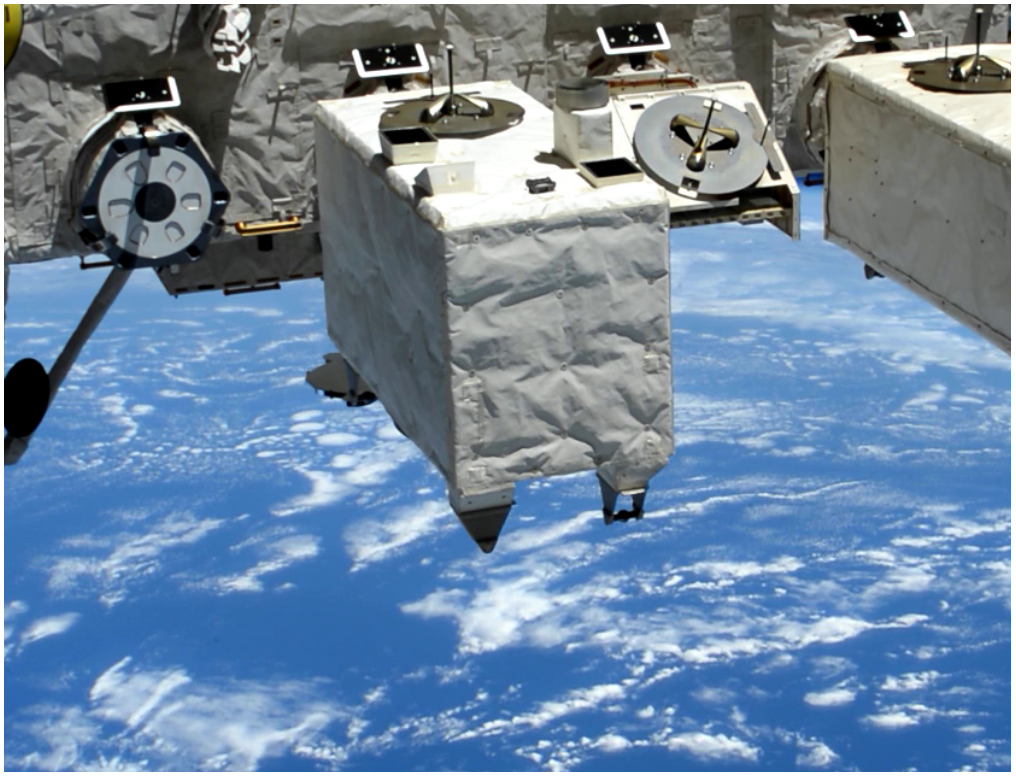
GEDI Science Team

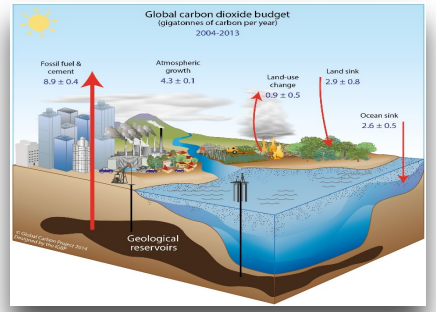
Important Facts About GEDI

- Operational as of April 2019 on the ISS
- Nominal on-orbit mission length of two years (April 2021)
  - In consideration for mission extension through 2023
- Uses a lidar instrument optimized for vegetation measurements
  - 3 lasers with full waveform measurements in the NIR (1064 nm)
  - 8 tracks of data with 25 m footprints, ~600 m between tracks
- GEDI is a sampling mission but produces gridded data products as well
  - 10 billion canopy structure measurements
  - 1 km grid resolution
- Six months of data currently available at LP DAAC

GEDI: NASA Earth Ventures Instrument (EVI)



GEDI Goal: Advance our ability to characterize the effects of changing climate and land use on ecosystem structure and dynamics



Carbon Cycle

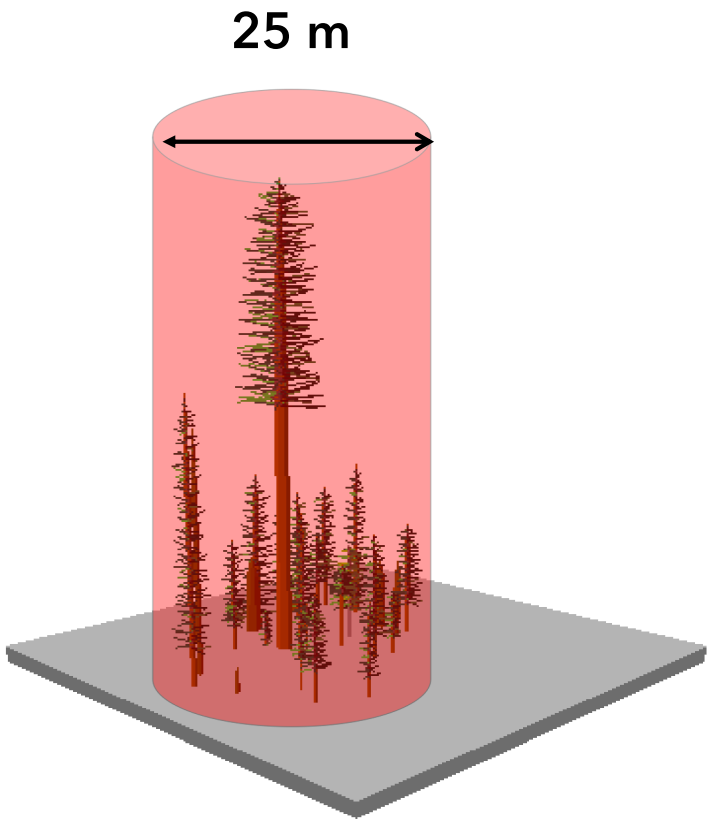
Biodiversity

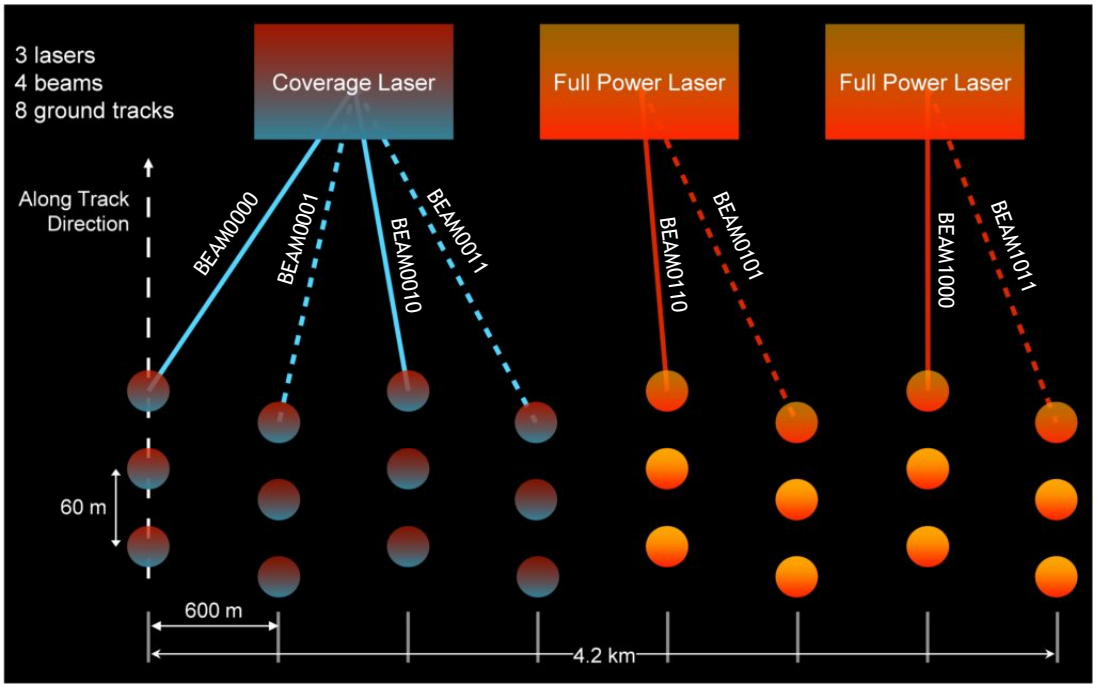
Science Applications

Geodetic-class laser ranging measurements have far reaching applications

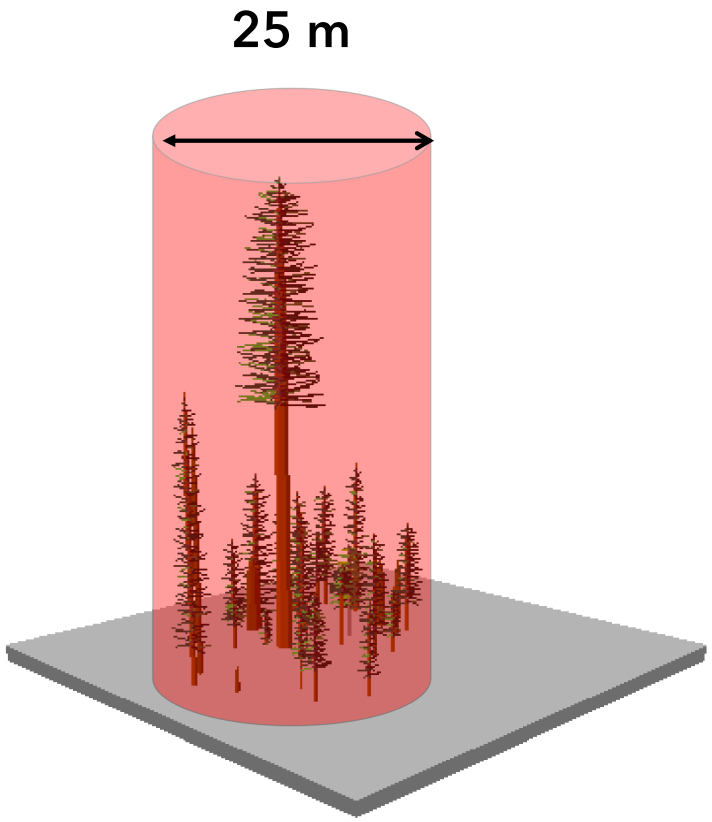
Forest height and vertical structure; habitat quality & biodiversity; Forest carbon sinks & source areas; loss of carbon from extreme events such as fires and hurricanes; parameterization of ecosystem models	Forest Management & Carbon Cycling
Canopy 3D structure that influences snowmelt, evapotranspiration, canopy interception of precipitation. Glacier surface elevation change; lake & river stage; snowpack elevation; coastal tides.	Water Resources
Improved canopy aerodynamic profiles to parameterize weather prediction models. Canopy and biomass products that initialize and constrain climate models; impacts of land use change on climate	Weather Prediction
Accurate bare earth and under canopy topographic elevations for improved digital elevation models from radar. Calibration of satellite based observations of surface deformation and earthquakes	Topography & Surface Deformation

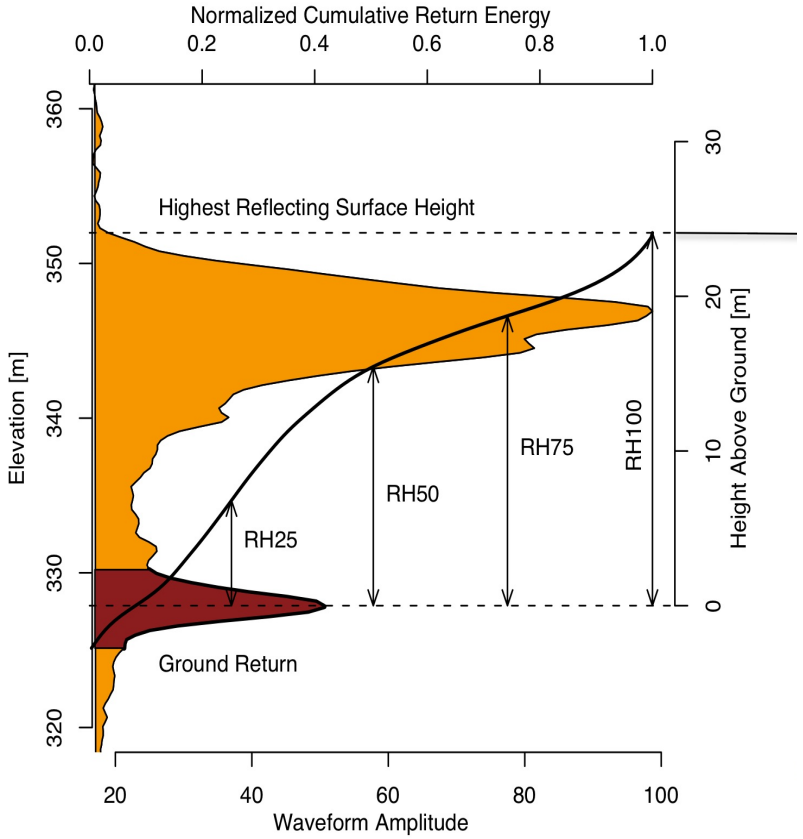
GEDI Lidar Measurements





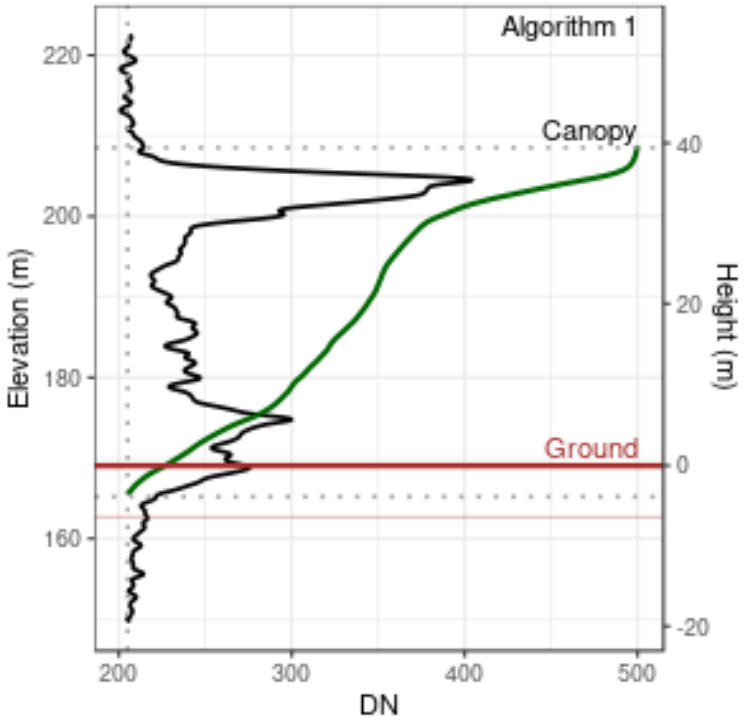
GEDI Lidar Measurements



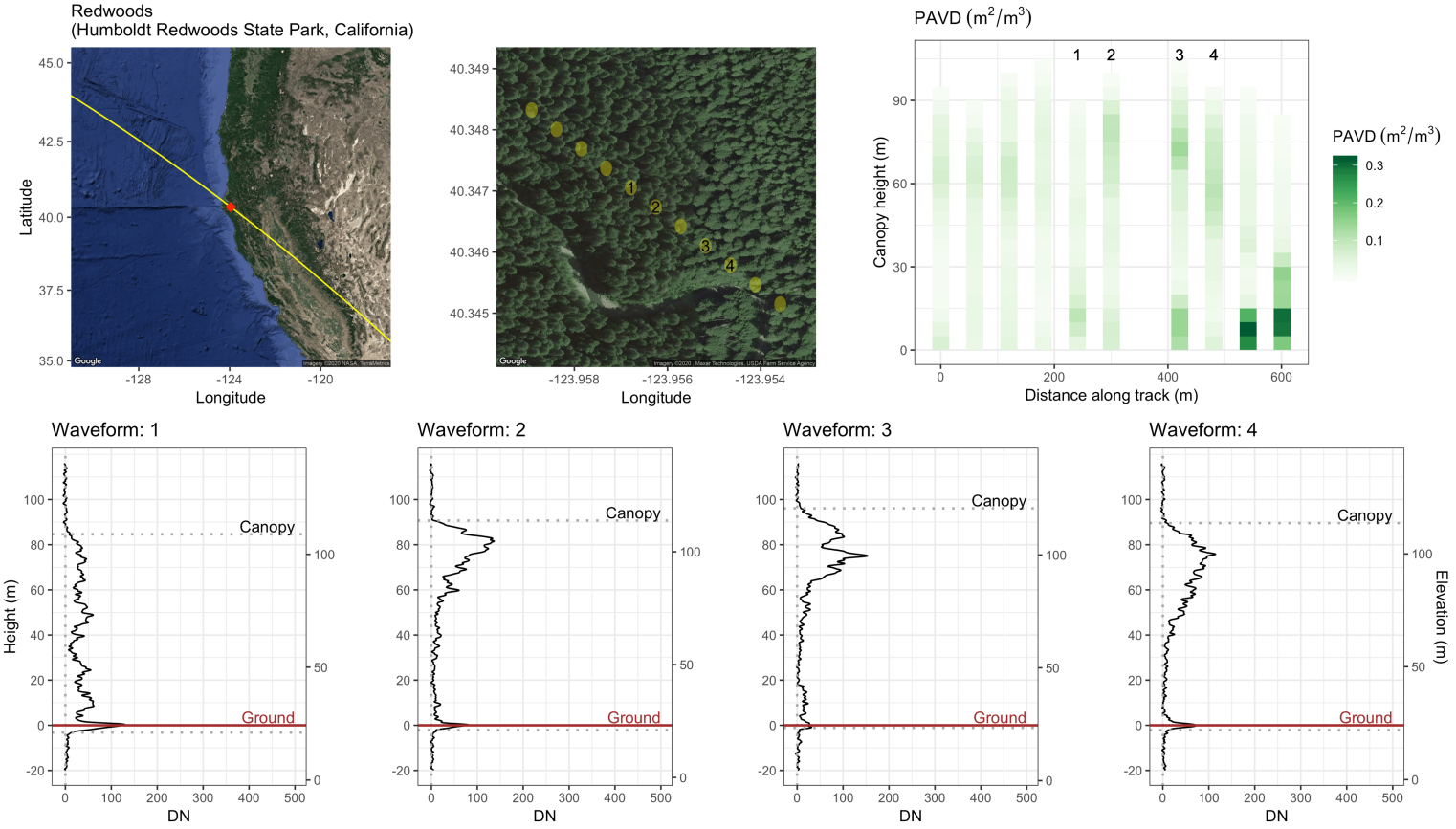


GEDI Data Products

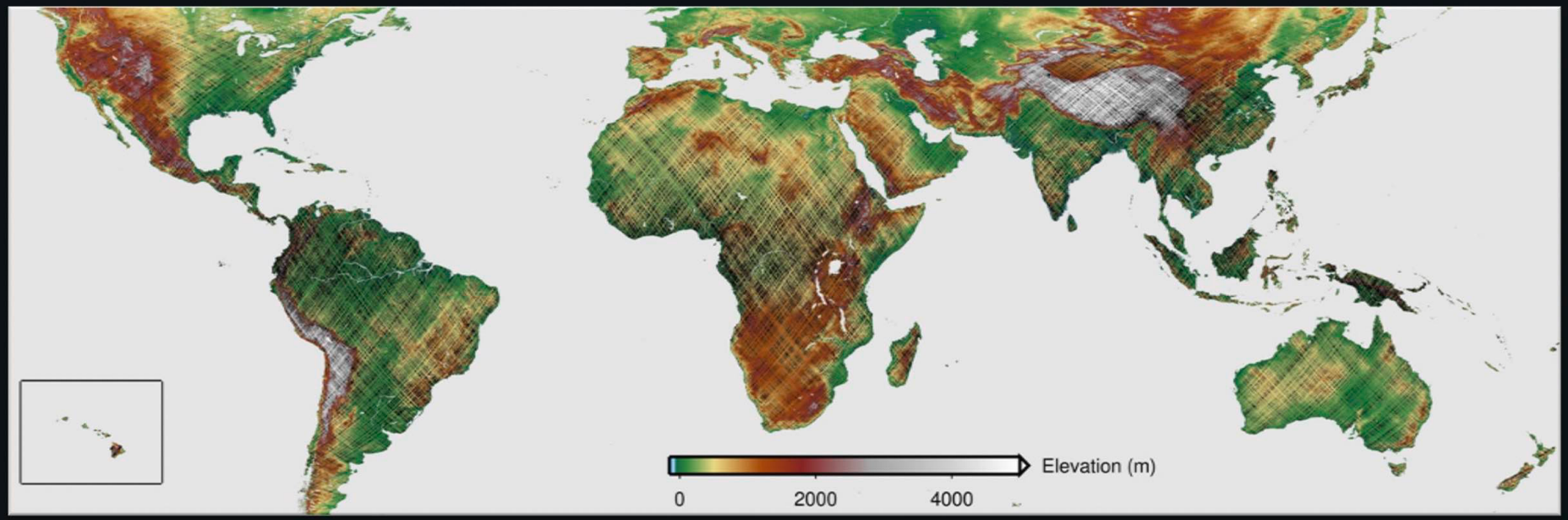
Product	Description
GEDI00_B	Level 0B: (not available)
GEDI01_A	Level 1A: (not available)
GEDI01_B	Level 1B: Geolocated Waveforms
GEDI02_A	Level 2A: Footprint Elevation and Height Metrics
GEDI02_B	Level 2B: Footprint Cover and Vertical Profile Metrics
GEDI03	Level 3A: Gridded Land Surface Metrics (2A and 2B)
GEDI04_A	Level 4A: Footprint Biomass
GEDI04_B	Level 4B: Gridded Biomass



GEDI L2 Data Products



GEDI Bare Earth Elevation



ABOUT THE MAP: This is a map of surface topographic elevations derived from 9 months of laser altimeter measurements from the Global Ecosystem Dynamics Investigation (GEDI). This is the first map to show the elevation of the ground surfaces *underneath* the dense canopies of pantropical and temperate forests. GEDI enables an unprecedented window into these areas allowing us to develop a better understanding of the interaction of climate, soils, and hydrology with forest ecosystem processes. For more information visit GEDI at *gedi.umd.edu*

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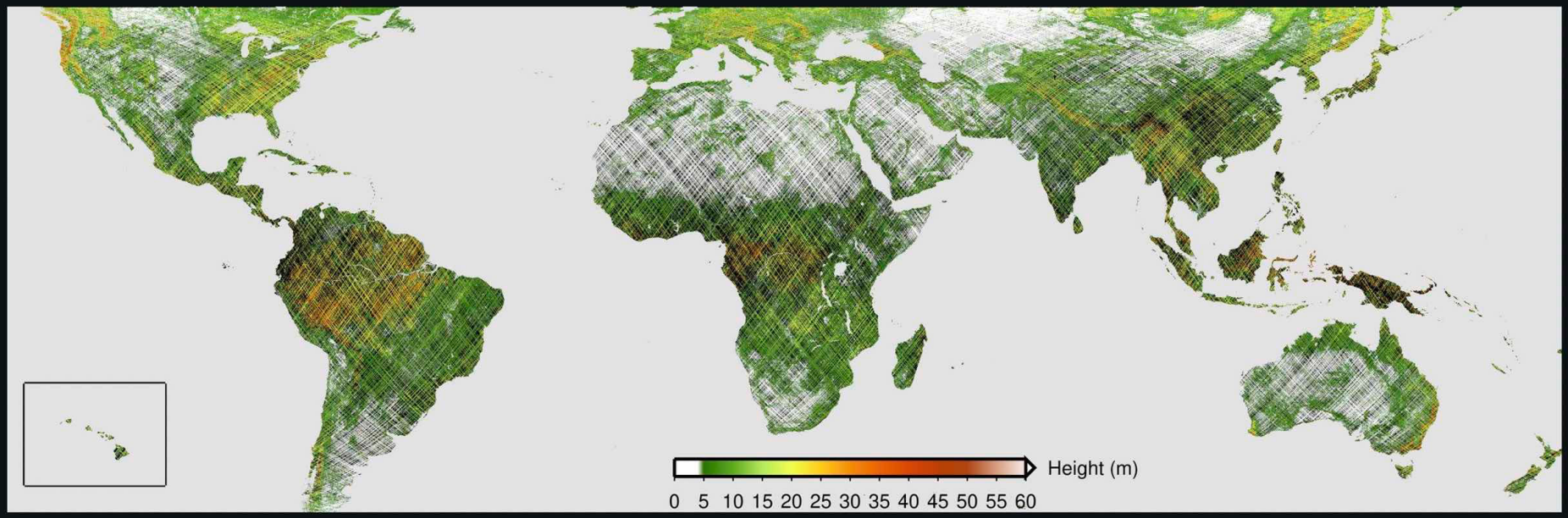
GEDI Forest Canopy Height



ABOUT THE MAP: This is a map of forest canopy heights from 9 months of laser altimeter measurements from the Global Ecosystem Dynamics Investigation (GEDI). GEDI data will provide the most accurate and complete mapping of canopy vertical structure every achieved for the pantropical and temperate forests of the Earth. For more information visit GEDI at *gedi.umd.edu*

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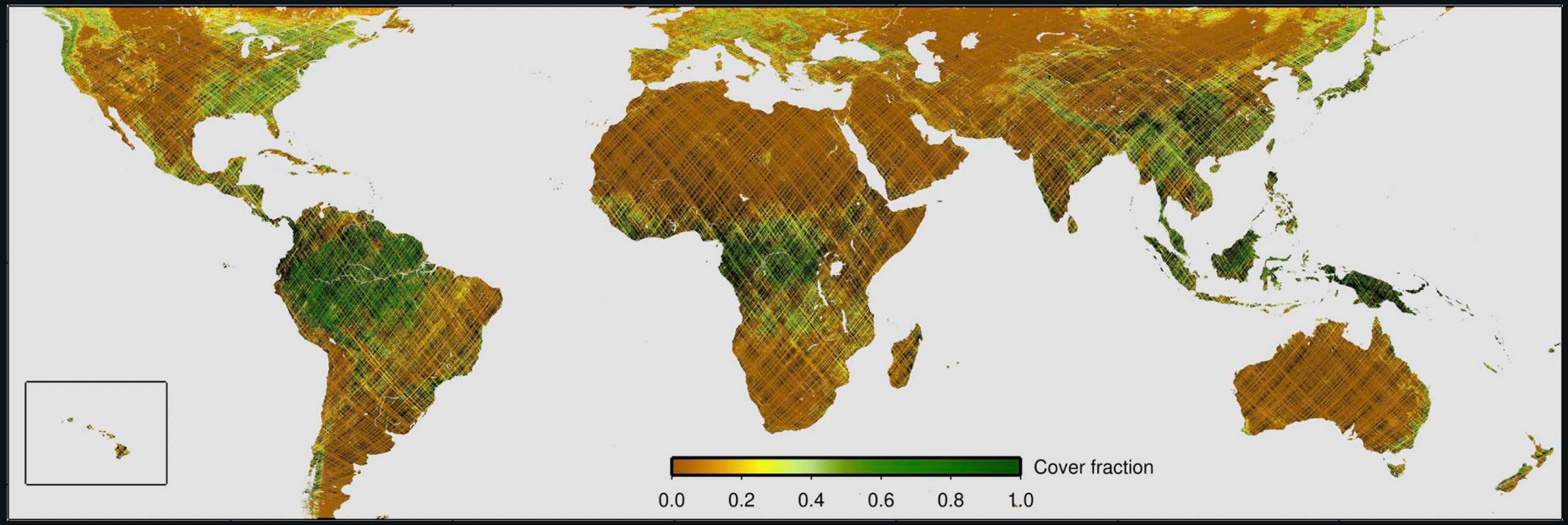
GEDI Canopy Cover



ABOUT THE MAP: This is a map of canopy cover derived from 9 months of laser altimeter measurements from the Global Ecosystem Dynamics Investigation (GEDI). Areas with high canopy cover, exceeding 90%, are key conservation targets because their forests sequester carbon dioxide from the atmosphere and provide important habitat that supports species richness and abundance. Lidar is the only technology that can accurately map these areas of high canopy cover. For more information visit GEDI at *gedi.umd.edu*

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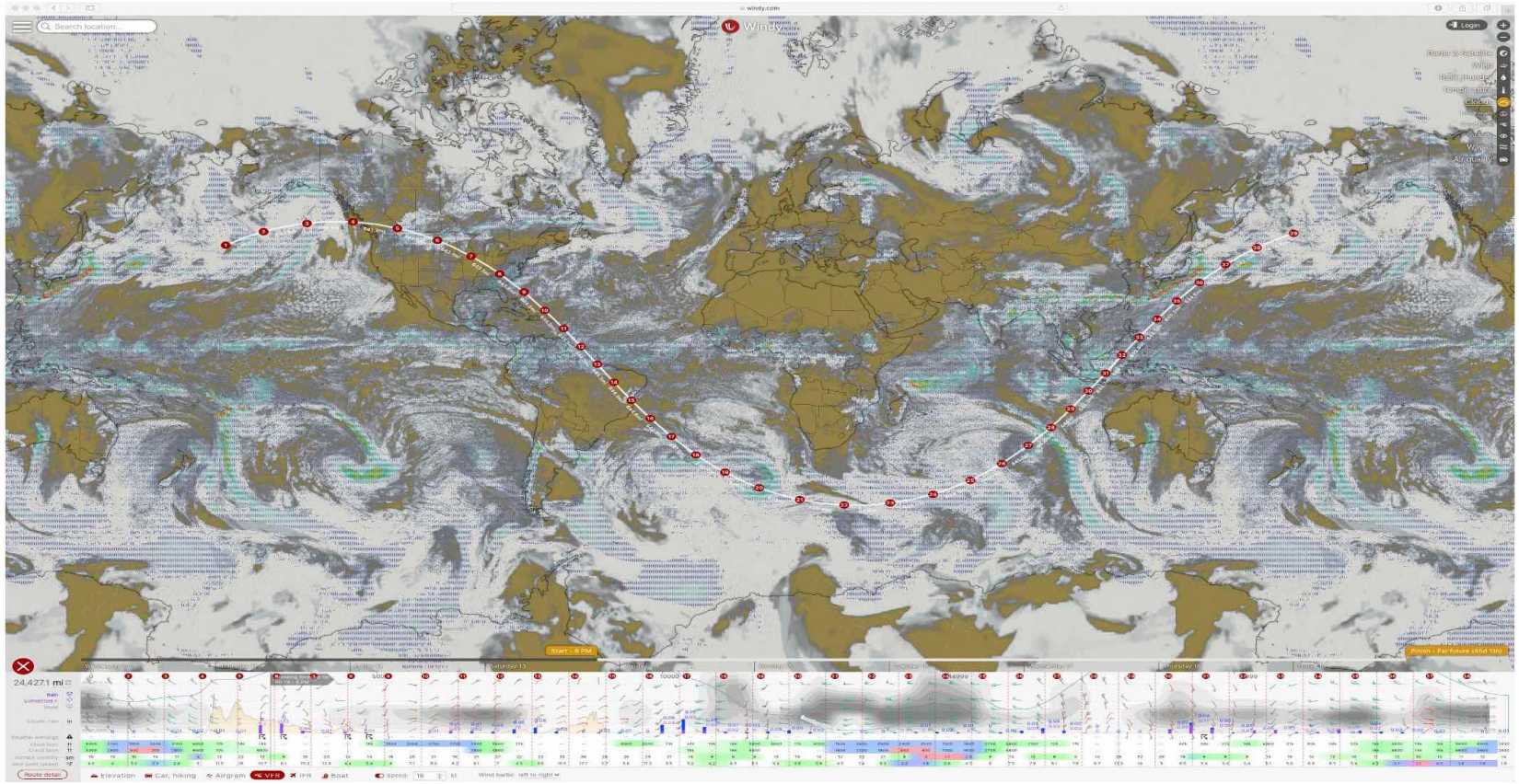
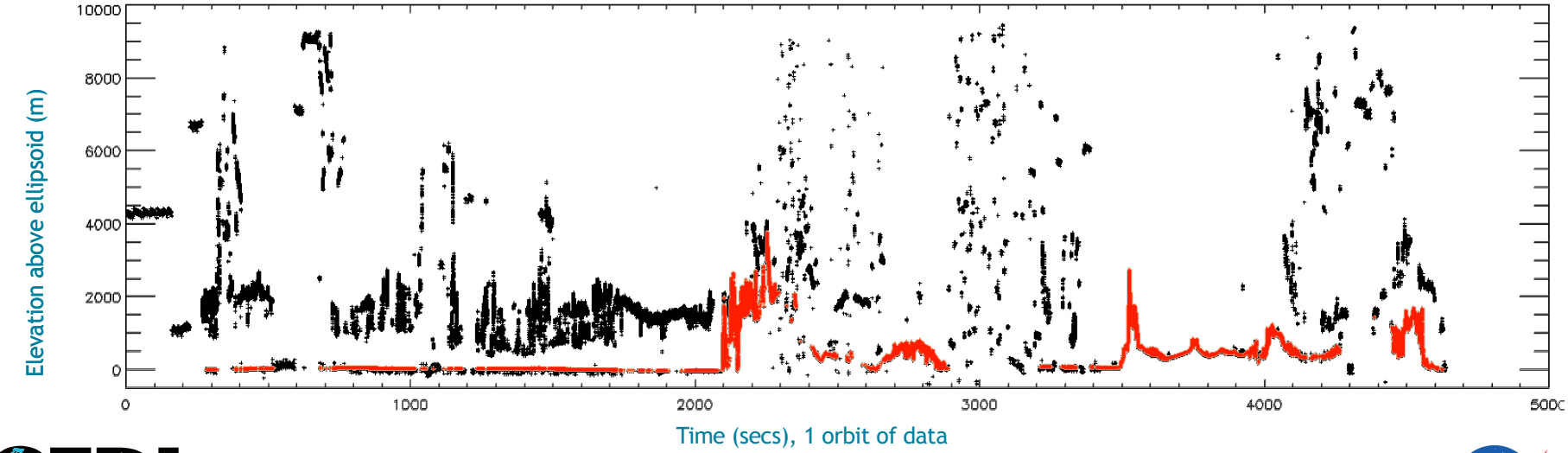
Clouds!



GEDI Operations

- A wide range of observing conditions are encountered on every orbit:
  - Clear skies to dense clouds
  - Measurements are taken day and night, and continuously over land
- Use the L2A Quality_flag to remove non-surface and low energy returns
- Use L2A Sensitivity field to choose the data that's appropriate for your application



Summary

- **GEDI began science measurements in April 2019, now halfway through a planned 2 year lifetime. Planning to request a 2 year mission extension.**

- **GEDI makes precise measurements of ecosystem structure and topography**
  - Provides long-needed observations of height, cover and vertical structure of forests
  - Contemporaneous observations from existing and planned missions provide a remarkable data opportunity
    - ECOSTRESS (Thermal Radiometer), ICESat-2 (Lidar), HISUI (JAXA hyperspectral Imager), NISAR (Radar)

- **GEDI Level1b (geolocated waveforms) and Level2A and B (Topography, canopy, and canopy vertical structure) products available through LP DAAC**
  - 6 months available now